

First photographic inland record of blacktip reef sharks *Carcharhinus melanopterus* (Carcharhiniformes: Carcharhinidae) in Indonesian waters

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Abstract

Blacktip reef sharks *Carcharhinus melanopterus* were caught and photographed by local people on 6 March 2019 during a flash flood in Sentani, Jayapura district, Papua province, Indonesia. The presence of *C. melanopterus* in Sentani represents the first inland record (c. 20 km) for this species in Indonesia. All individuals found were small-sized sharks (c. 500-600 mm), suggesting very young juveniles. We presume their occurrence in Sentani a few hours after a flash flood is in response to seasonal freshwater inflow to estuarine environment.

Key words: distribution, whaler shark, *Carcharhinus melanopterus*, Indonesia, Papua, freshwater.

Introduction

Elasmobranch fishes evolved as a group in the marine environment during the Devonian period, and those presently living in freshwater presumably represent a more recent adaption (Perlman & Goldstein 1988). The blacktip reef shark *Carcharhinus melanopterus* (Quoy & Gaimard, 1824) is a medium-sized elasmobranch of whaler shark (family Carcharhinidae) that reportedly grows up to 1.5 m (total length) and occurs throughout the tropics from the Red and Indian Sea (Chin *et al.* 2013b). In Indonesia, the species has been recorded from Sumatra, Kalimantan, Java, Bali, Sulawesi, Lombok, West Timor and Papua (White 2007; Last *et al.* 2010; Dharmadi *et al.* 2016). The *C. melanopterus* inhabits very shallow water on coral reefs and reef flats, also near reef drop offs, rarely close to offshore (Compagno *et al.* 2005; Ebert *et al.* 2013). The species has also been observed in turbid outropic coastal environments that are dominated by non-reef habitat such as mangroves, sea grass and coastal mudflats, and may regularly occur in these areas (Lyle 1987; Chin *et al.* 2012; Chin *et al.* 2013a).

This paper reports the first inland and freshwater habitat record of *C. melanopterus* in Indonesian based on photographic evidence.

Materials and Methods

The specimens of *C. melanopterus* (c. 500-600 mm) were found and photographed on 6 March 2019 at Sentani, Jayapura district, Papua province, Indonesia (02°33'50"S, 140°29'46"E) (Fig. 1). The site is in lowland habitat located c. 20 km distance from the sea, bordered by hilly areas (Cyclops Nature Reserve) and Sentani lake. These findings of *C. melanopterus* in Sentani were also reported by local media online in Indonesia (Fajar 2019; Putri 2019). All specimens were reported caught by hand a few hours after a flash flood. The sharks were identified as *C. melanopterus* by combination of specific morphological characters. None of these specimens were preserved and no specific measurements taken but all three were of similar size (Fig. 2-3).

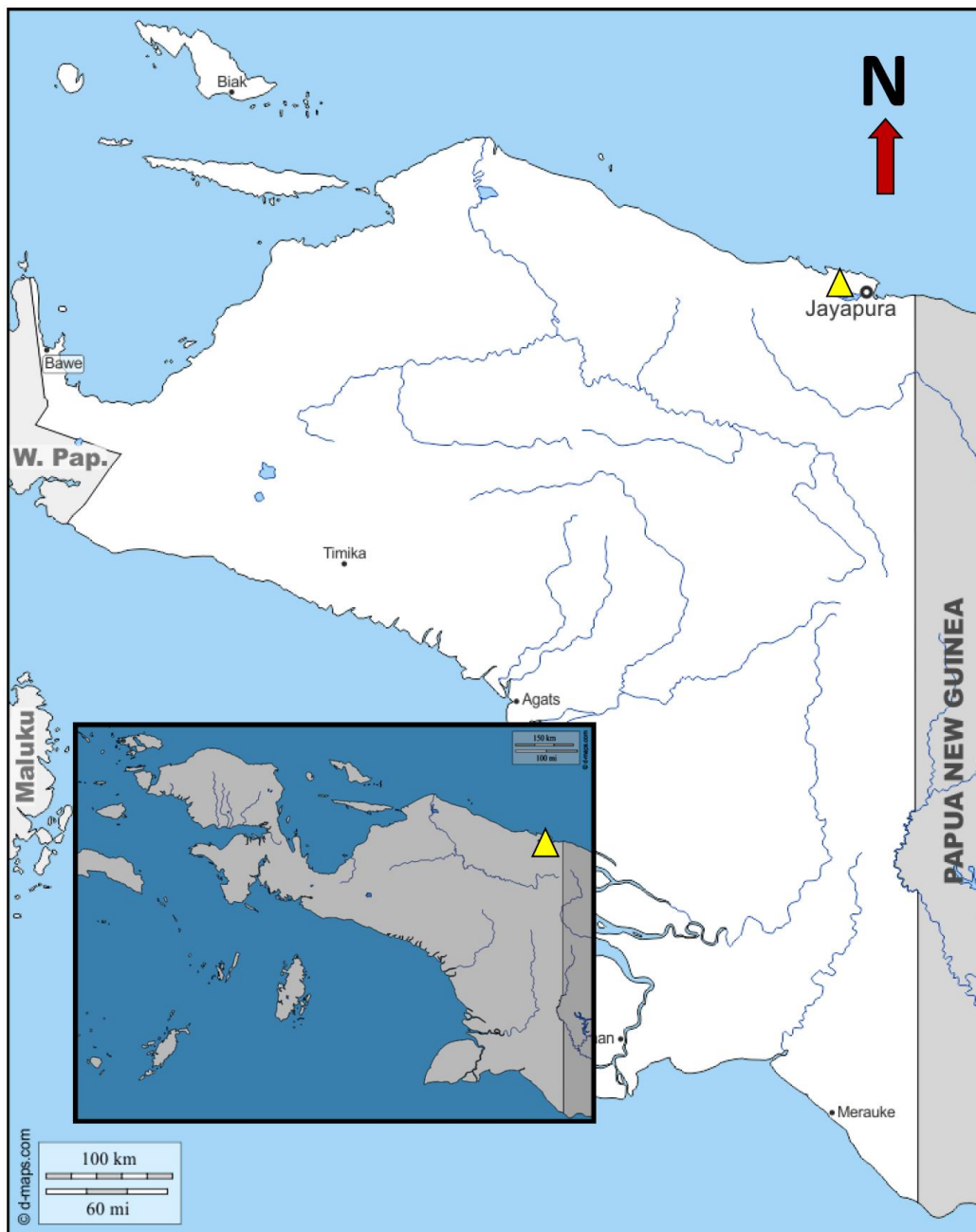


Figure 1. Location of *C. melanopterus* (yellow triangle) found in freshwater habitat in Sentani, Papua province, Indonesia.



Figure 2. Two *C. melanopterus* caught by local people on 6 March 2019 in Sentani, Papua province, Indonesia (Photo: Gloria Setyvani Putri).



Figure 3. A third *C. melanopterus* caught by local people on 6 March 2019 in Sentani, Papua province, Indonesia (Photo: Jay Fajar).

Results and Discussions

The blacktip reef shark is distinguished from other *Carcharhinus* whaler sharks or related Carcharhinidae family by its distinct black fin tips. There are few *Carcharhinus* sharks that have black fin tips; graceful shark *C. amblyrhynchoides*, nervous shark *C. cautus*, spinner shark *C. brevipinna*, smoothtooth blacktip shark *C. leiodon*, blacktip shark *C. limbatus* and Australian blacktip shark *C. tilsoni*. The *C.*

amblyrhynchoides, *C. brevipinna*, *C. leiodon* and *C. limbatus* were eliminated as the species in hand by an absence of black marking on the upper post ventral margin of the caudal fin (see Ebert *et al.* 2013). The sharks captured are similar to *C. cautus* and *C. tilsoni* with black markings on the upper post ventral margin of the caudal fin, but they differ by having more extended black markings on their dorsal fin and on the ventral lobe of caudal fin, as well as having an absence of black marking on dorsal caudal margin of the caudal fin. These black markings are visible in the photographs taken of the captured sharks (Fig. 2-3).

Carcharhinus melanopterus inhabits coral reef habitats as well as shallow coastal waters such as intertidal foreshores and mangroves (Chin *et al.* 2012; Chin *et al.* 2013a, b). It has been reported that *C. melanopterus* occurs in freshwater (Perlman & Goldstein 1988; Compagno & Niem 1998), but it is probably a rare or unusual habitat type for this species. This record of *C. melanopterus* in freshwater habitat near Sentani lake is rare and constitutes the first inland record in Indonesian waters. There are other records of *C. melanopterus* found elsewhere in Indonesia but none of these records are from freshwater (White 2007; Dharmadi *et al.* 2016).

The *C. melanopterus* found in Sentani were small-sized sharks c. 500 mm, compared to adults which can reach 1.500 mm (Compagno & Niem 1998; Chin *et al.* 2013b) suggesting that they were very young individuals. It is thought that *C. melanopterus* in Indonesian give birth in August and September (White 2007). Field observations from eastern coast of Queensland, Australia, indicate that parturition occurs during the Austral summer and into early autumn (November to February) (Chin *et al.* 2013b). The finding of *C. melanopterus* in Sentani coincided with a flash flood where the water rose 2.5 m. Flash floods make water conditions turbid. Chin *et al.* (2013a) reported that in turbid coastal environments *C. melanopterus* had a highly structured population comprised almost entirely of juveniles and adult females, with individuals between 850 and 1.050 mm total length effectively absent (Chin *et al.* 2013b).

It is unclear why young juveniles of *C. melanopterus* were found in inland freshwater habitat a few hours after the flash flood in Sentani. Tropical nearshore environments are highly dynamic systems owing to extreme freshwater flow and flooding episodes that occur in wet-season months (Knip *et al.* 2011). Bull sharks *C. leucas* have also been reported in freshwater in Indonesia (Iqbal *et al.* 2019). *Carcharhinus melanopterus* and *C. leucas* are close relatives and may have similar physiological capabilities and behavioural characteristics. However, although there are many reports of *C. melanopterus* elsewhere in Indonesia none of them have been in freshwater (White, 2007; Last *et al.* 2010, Dharmadi *et al.* 2016). Knip *et al.* (2011) found pigeye shark *C. amboinensis* juveniles respond to seasonal freshwater inflow and that may also be true for juvenile *C. melanopterus*. Moreover, information on Indonesian elasmobranchs may be very limited because there is a lack of expert ichthyologists in the region. However, recent work shows that a few species of elasmobranchs have been found locally such as *Fluvitrygon oxyrhynchus*, *Urogymnus polylepis* and *C. leucas* (Iqbal *et al.* 2018; Iqbal *et al.* 2019; Windusari *et al.* 2019). More data on reproduction and response to seasonal freshwater inflow are needed to better understanding the ecology of blacktip reef sharks in Indonesia.

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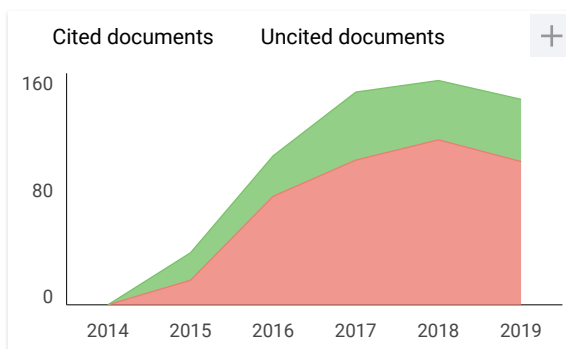
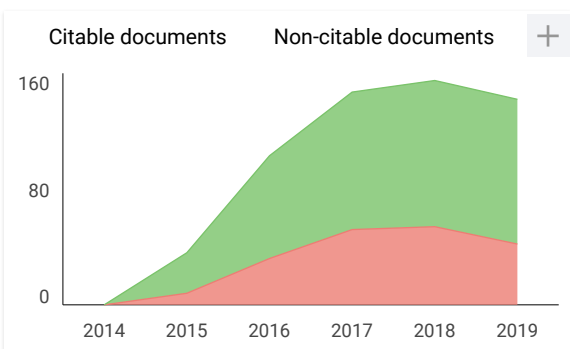
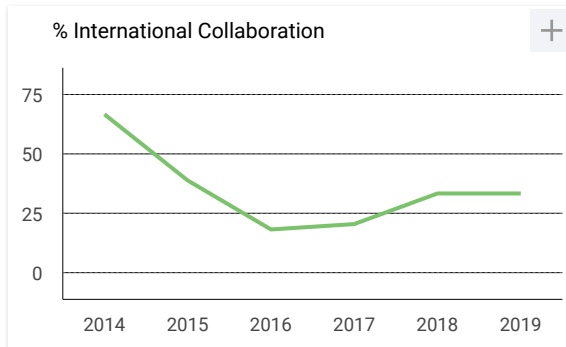
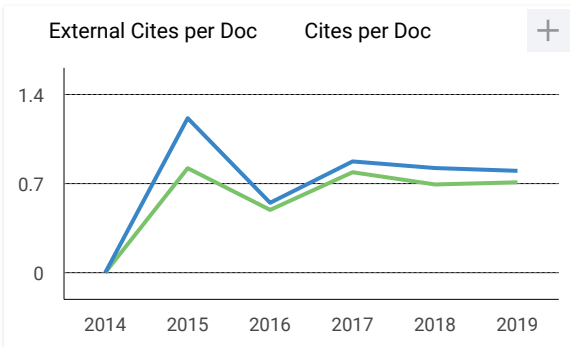
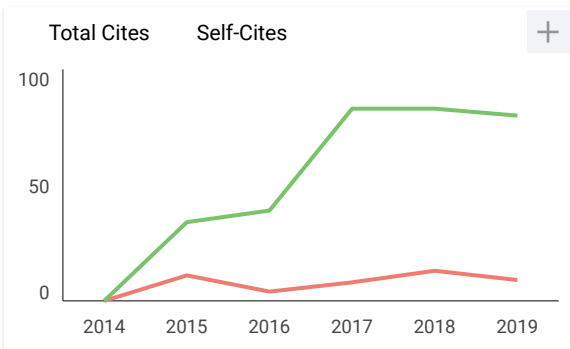
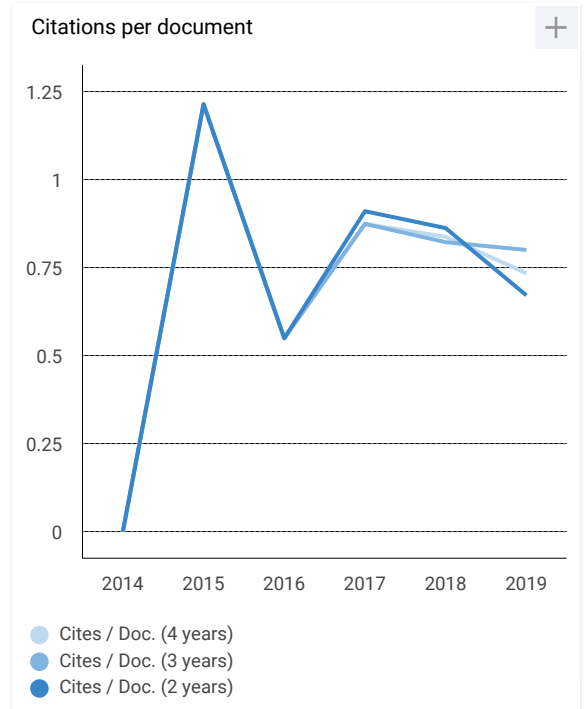
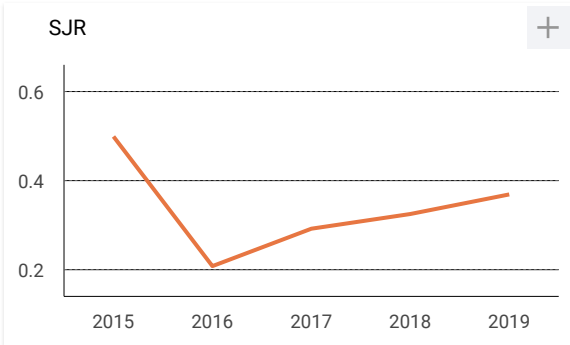
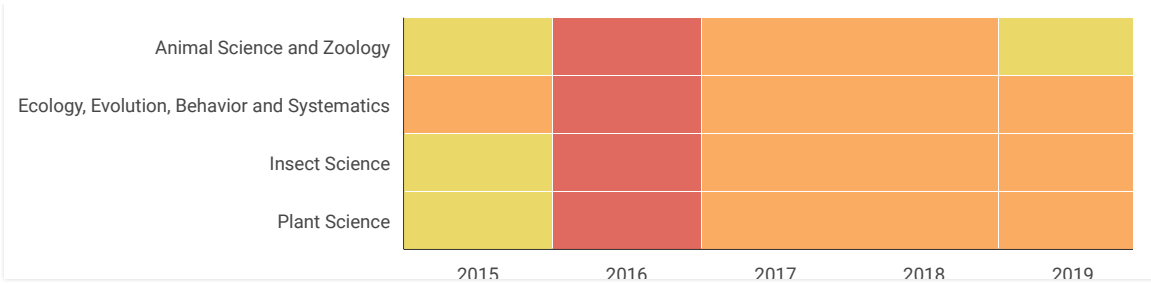


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By Arum Setiawan

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Introduction

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This paper reports the first inland and freshwater habitat record of *C. melanopterus* in Indonesian based on photographic evidence.

Materials and Methods

The specimens of *C. melanopterus* (c. 500-600 mm) were found and photographed on 6 March 2019 at Sentani, Jayapura district, Papua province, Indonesia (02°33'50"S, 140°29'46"E) (Fig. 1). The site is in lowland habitat located c. 20 km distance from the sea, bordered by hilly areas (Cyclops Nature Reserve) and Sentani lake. These findings of *C. melanopterus* in Sentani were also reported by local media online in Indonesia (Fajar 2019; Putri 2019). All specimens were reported caught by hand a few hours after a flash flood. The sharks were identified as *C. melanopterus* by combination of specific morphological characters. None of these specimens were preserved and no specific measurements taken but all three were of similar size (Fig. 2-3).

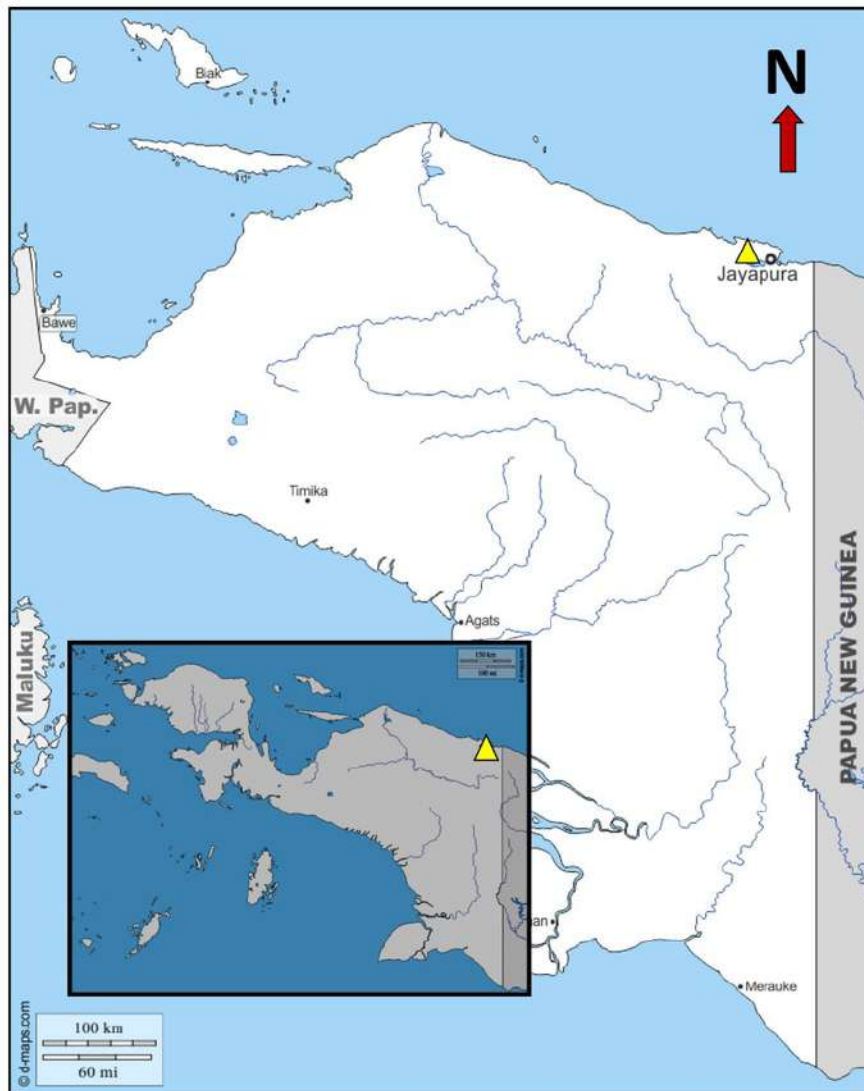


Figure 1. Location of *C. melanopterus* (yellow triangle) found in freshwater habitat in Sentani, Papua province, Indonesia.



Figure 2. Two *C. melanopterus* caught by local people on 6 March 2019 in Sentani, Papua province, Indonesia (Photo: Gloria Setyvani Putri).



Figure 3. A third *C. melanopterus* caught by local people on 6 March 2019 in Sentani, Papua province, Indonesia (Photo: Jay Fajar).

Results and Discussions

The blacktip reef shark is distinguished from other *Carcharhinus* whaler sharks or related Carcharhinidae family by its distinct black fin tips. There are few *Carcharhinus* sharks that have black fin tips; graceful shark *C. amblyrhynchoides*, nervous shark *C. cauius*, spinner shark *C. brevipinna*, smoothtooth blacktip shark *C. leiodon*, blacktip shark *C. limbatus* and Australian blacktip shark *C. tilsoni*. The *C.*

amblyrhynchoides, *C. brevipinna*, *C. leiodon* and *C. limbatus* were eliminated as the species in hand by an absence of black marking on the upper post ventral margin of the caudal fin (see Ebert *et al.* 2013). The sharks captured are similar to *C. cautus* and *C. tilsoni* with black markings on the upper post ventral margin of the caudal fin, but they differ by having more extended black markings on their dorsal fin and on the ventral lobe of caudal fin, as well as having an absence of black marking on dorsal caudal margin of the caudal fin. These black markings are visible in the photographs taken of the captured sharks (Fig. 2-3).

Carcharhinus melanopterus inhabits coral reef habitats as well as shallow coastal waters such as intertidal foreshores and mangroves (Chin *et al.* 2012; Chin *et al.* 2013a, b). It has been reported that *C. melanopterus* occurs in freshwater (Perlman & Goldstein 1988; Compagno & Niem 1998), but it is probably a rare or unusual habitat type for this species. This record of *C. melanopterus* in freshwater habitat near Sentani lake is rare and constitutes the first inland record in Indonesian waters. There are other records of *C. melanopterus* found elsewhere in Indonesia but none of these records are from freshwater (White 2007; Dharmadi *et al.* 2016).

The *C. melanopterus* found in Sentani were small-sized sharks c. 500 mm, compared to adults which can reach 1.500 mm (Compagno & Niem 1998; Chin *et al.* 2013b) suggesting that they were very young individuals. It is thought that *C. melanopterus* in Indonesian give birth in August and September (White 2007). Field observations from eastern coast of Queensland, Australia, indicate that parturition occurs during the Austral summer and into early autumn (November to February) (Chin *et al.* 2013b). The finding of *C. melanopterus* in Sentani coincided with a flash flood where the water rose 2.5 m. Flash floods make water conditions turbid. Chin *et al.* (2013a) reported that in turbid coastal environments *C. melanopterus* had a highly structured population comprised almost entirely of juveniles and adult females, with individuals between 850 and 1.050 mm total length effectively absent (Chin *et al.* 2013b).

It is unclear why young juveniles of *C. melanopterus* were found in inland freshwater habitat a few hours after the flash flood in Sentani. Tropical nearshore environments are highly dynamic systems owing to extreme freshwater flow and flooding episodes that occur in wet-season months (Knip *et al.* 2011). Bull sharks *C. leucas* have also been reported in freshwater in Indonesia (Iqbal *et al.* 2019). *Carcharhinus melanopterus* and *C. leucas* are close relatives and may have similar physiological capabilities and behavioural characteristics. However, although there are many reports of *C. melanopterus* elsewhere in Indonesia none of them have been in freshwater (White, 2007; Last *et al.* 2010; Dharmadi *et al.* 2016). Knip *et al.* (2011) found pigeye shark *C. amboinensis* juveniles respond to seasonal freshwater inflow and that that may also be true for juvenile *C. melanopterus*. Moreover, information on Indonesian elasmobranchs may be very limited because there is a lack of expert ichthyologists in the region. However, recent work shows that a few species of elasmobranchs have been found locally such as *Fluvitrygon oxyrhynchus*, *Urogymmus polylepis* and *C. leucas* (Iqbal *et al.* 2018; Iqbal *et al.* 2019; Windusari *et al.* 2019). More data on reproduction and response to seasonal freshwater inflow are needed to better understanding the ecology of blacktip reef sharks in Indonesia.

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A handwritten signature in black ink, appearing to be 'Hery Purnobasuki', written in a cursive style.

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